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KRAMER ELECTRONICS LTD.

USER MANUAL

MODELS:

KDS-EN2T
HDMI to IP Transmitter

KDS-EN2R
HDMI to IP Receiver

P/N: 2900-300158 Rev 2

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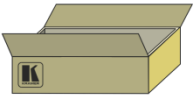
KDS-EN2T/R Quick Start Guide

This guide helps you install and use your product for the first time. For more detailed information, go to http://www.kramerelectronics.com/support/product_downloads.asp to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

- **KDS-EN2T** HDMI to IP Transmitter and/or **KDS-EN2R** HDMI to IP Rceiver
- 2 Power supplies (5V DC)
- 1 Quick start guide



Save the original box and packaging materials in case you need to return your product for service.

Step 2: Install the KDS-EN2T/R

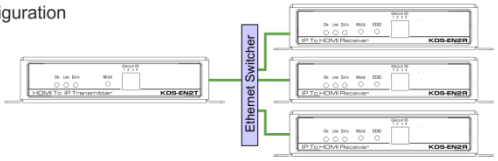
Mount the machine in a rack, place on a table or attach to the VESA MIS-D 100 compliant mounting points.

Step 3: Connect the transmitter and Receiver

Single Transmitter-Receiver Configuration

Switch off the power to every device before connecting a **KDS-EN2T/R system**.

Multicast Configuration



TV Wall Configuration

A source (for example, a DVD player) is connected to each transmitter (host) and an acceptor (for example, a display) is connected to each receiver.
When connecting AV equipment to the **KDS-EN2T/R** we recommend that you use Kramer high-performance cables for best results.

Step 4: Connect the power

Connect the power to each transmitter and receiver.

Step 5: Configure the system

Use the IP HDMI Utility software and the Web pages to configure the system.

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 11 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters and GROUP 11: Sierra Video Products.

Thank you for purchasing the Kramer DigiTOOLS® **KDS-EN2T** *HDMI to IP Transmitter* and/or **KDS-EN2R** (sold separately), which are ideal for:

- Digital signage, retail centers and leisure facilities
- Transportation hubs, educational facilities and corporate environments

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2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual

Go to http://www.kramerelectronics.com to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **KDS-EN2T**/**KDS-EN2R** away from moisture, excessive sunlight and dust
- It is recommended to operate the system on a dedicated Gigabit Ethernet network, not to be combined with other network traffic or with access to the Internet

This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

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2.2 Safety Instructions

Caution: There are no operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics input power wall adapter that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at *http://www.kramerelectronics.com/support/recycling/*.

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3 Overview

The Kramer **KDS-EN2T** and **KDS-EN2R** are an IP transmitter (host) and receiver (client) system for HDMI and bidirectional RS-232 signals. The **KDS-EN2T** encodes the input signals to an IP stream and the **KDS-EN2R** decodes it back to HDMI and RS-232 signals.

The host-client system lets you stream HD content simultaneously to one or more HDMI acceptors.

The Kramer **KDS-EN2T** and **KDS-EN2R** can be used to distribute Full-HD digital content from multiple sources to more than 200 remote displays on a LAN without distance limitations from the 1080p source devices, while sustaining picture and sound quality.

In addition, the **KDS-EN2T**/**KDS-EN2R** features:

- Flexible and scalable HDMI 1080p video broadcasting with Gigabit Ethernet LAN and no distance limitations
- JPEG 2000 compression technology to send a visually lossless HD image and digital audio over IP
- Point to point, Multicasting and broadcasting architecture, with limited bandwidth load (each channel requires about 55Mbps)
- Up to nine transmitters and 81 receivers that can be included in a video wall system
- HDMI signal transmissions over one CAT 5e, CAT 6 or CAT 7 cable
- Group ID setup via DIP-switches or PC application
- Bidirectional RS-232 Control Pass-through to control HDMI display from the host (transmitter) side
- Multicasting groups with Gigabit Ethernet switch (requires IEEE 802.1Q VLAN and IGMP functions)
- System setup via the IP-HDMI PC application and the Web pages
- A compact DigiTOOLS® enclosure with a built-in mounting plate for versatile installation

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Note that the **KDS-EN2T**/**KDS-EN2R** is not HDCP compliant and will not stream HDCP encrypted content and the screen will appear black.

3.1 Using the Cables

This product uses standard Ethernet cables (CAT 5/6/7). We recommend that you use Kramer high quality Twisted Pair cables.

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4 Defining the KDS-EN2T and KDS-EN2R

This section defines the **KDS-EN2T** *HDMI to IP Transmitter* (see Section 4.1) and **KDS-EN2R** (see Section 4.2). Section 4.3 defines the underside of both the **KDS-EN2T** and **KDS-EN2R**.

4.1 The KDS-EN2T HDMI to IP Transmitter

Figure 1 defines the **KDS-EN2T**:

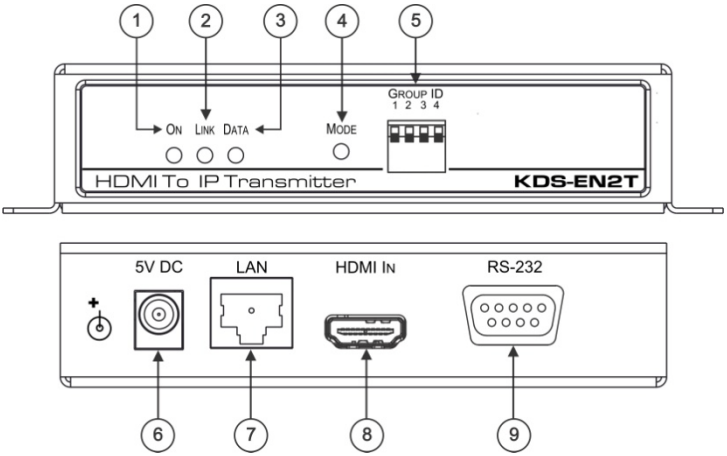

Figure 1: KDS-EN2T HDMI to IP Transmitter

#	Feature	Function
1	*ON* LED	Lights green when the power is ON and the system is active Blinks when the power is ON and the system is booting
2	*LINK* LED	Lights green to indicate that a link is established
3	*DATA* LED	Lights green when system is active Blinks when connecting to the receiver or if the HDMI source is disconnected
4	*MODE* Button	Press the button using a small screwdriver (see Section 4.3)
5	*GROUP* ID DIP-switches	Set the group ID (see Section 4.4)
6	*5VDC* Output BNC Connector	+5V DC connector for powering the unit
7	*LAN* RJ-45 Connector	Connects to the LAN RJ-45 connector on the **KDS-EN2R** directly or via an Ethernet switch
8	*HDMI IN* Connector	Connects to an HDMI source
9	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 port

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4.2 Your KDS-EN2R

Figure 2 defines the **KDS-EN2R**:

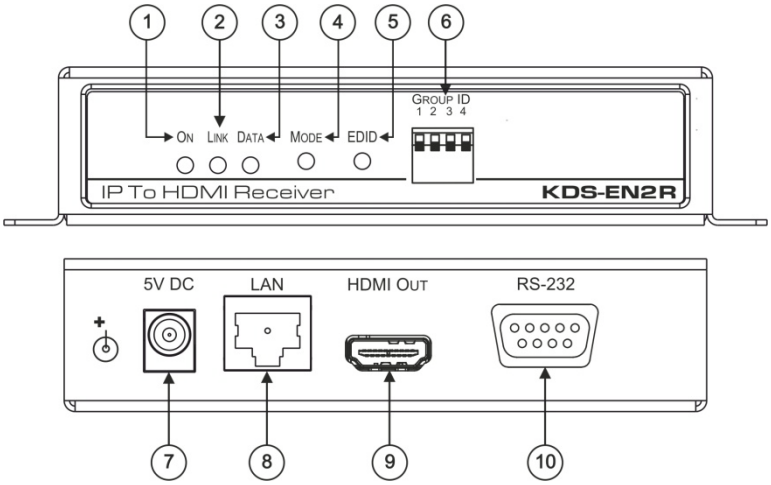

Figure 2: KDS-EN2R

#	Feature	Function
1	*ON* LED	Lights green when the power is ON and the system is active Blinks when the power is ON and the system is booting
2	*LINK* LED	Lights green when LAN is connected
3	*DATA* LED	Lights green when system is active Blinks when connecting to the transmitter or if the HDMI source is disconnected
4	*MODE* Button	Press the MODE button using a small screwdriver (see Section 4.3)
5	*EDID* Button	Press the EDID button using a small screwdriver (see Section 4.3)
6	*GROUP ID* DIP-switches	Set the group ID (see Section 4.4)
7	*5V DC*	+5V DC connector for powering the unit
8	*LAN* RJ-45 Connector	Connects to the LAN RJ-45 connector on the **KDS-EN2T** directly or via an Ethernet switch
9	*HDMI OUT* Connector	Connects to the HDMI acceptor
10	*RS-232* 9-pin D-sub Connector	Connects to an RS-232 port

4.3 Underside of the KDS-EN2T/KDS-EN2R

The underside of both the **KDS-EN2T** and **KDS-EN2R** defines the button functionality, as illustrated in Figure 3:

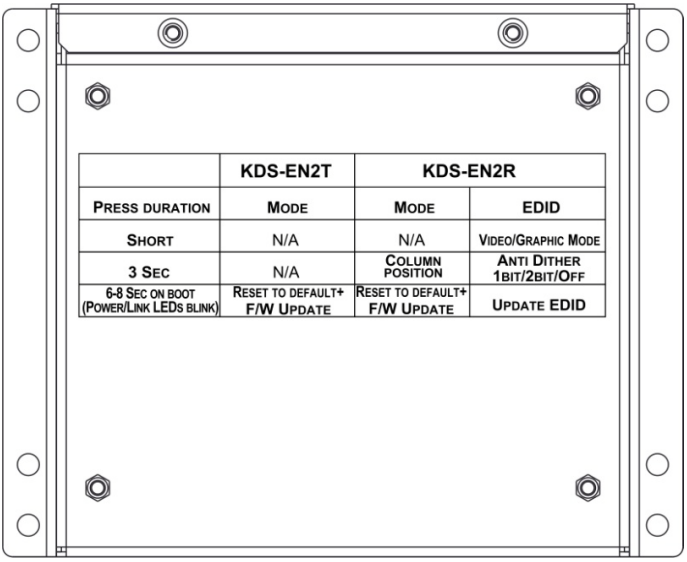

Figure 3: KDS-EN2R Underside

Press Duration	KDS-EN2T	KDS-EN2R	
	MODE Button	**MODE Button**	**EDID Button**
Short	N/A	N/A	Video/graphic mode (see Section 4.3.1)
3 seconds	N/A	Column position Press to change the column position of the unit when in the OSD	Anti Dither 1bit/2bit/Off (see Section 4.3.2)
6 to 8 seconds on boot POWER and LINK LEDs blink	Reset to factory default + FW update (see Section 4.3.4)	Reset to factory default + F/W update (see Section 4.3.4)	Update EDID (see Section 4.3.3)

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4.3.1 Video/Graphic Mode

Press the EDID button on the **KDS-EN2R** to toggle between the Video mode and the Graphic mode. The selection is immediately saved to flash memory and is saved to the non-volatile memory after rebooting the unit. In the:

- **Video Mode**, the FW automatically trades off the bandwidth with higher video quality to ensure a smooth video playing experience
- **Graphic Mode**, the FW fixes the trade-off to ensure the best possible graphic/text viewing experience

4.3.2 Anti Dither

Press and hold (for 3 sec) the EDID button on the **KDS-EN2R** to cycle between the anti-dithering modes (1 bit, 2 bit or Off).

Dithering introduces random noise to the signal that creates a half-tone effect so that the output image appears smoother. Dithering creates a problem for low bandwidth video compression even for a static source display.

To overcome the dithering problem, set the anti dither (EDID) button to 1bit or 2 bit. Set to Off if the source content does not generate a dithered output.

4.3.3 Update EDID

The **KDS-EN2T** is shipped with a factory default EDID. We recommend updating this EDID to that of the acceptor connected to the **KDS-EN2R**. This EDID update ensures optimum performance according to the output resolution of the connected HDMI acceptor.

To manually update the EDID:

1. Connect the new HDMI acceptor to the **KDS-EN2R**.
2. Press and hold the EDID button (for about 6 to 8 sec) on the **KDS-EN2R** to update the EDID.
   The EDID is updated and stored on the **KDS-EN2T**.

Note that in a multicast setup (see Section 5.2) it is important to update the EDID while the HDMI acceptor with the lowest resolution is connected. Once the update is complete, this EDID information will be saved to the non-volatile memory of the **KDS-EN2T**.

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4.3.4 Reset to Factory Default + FW Update

Press and hold (for 6 to 8 sec) the MODE button on the **KDS-EN2T/KDS-EN2R** to reset to the factory default and upgrade the firmware.

You can upgrade the firmware via the Web Pages or the IP HDMI Utility program (see Section 6.4.1.2).

Firmware update file name will be: Transmitter: webfwh.bin; Receiver: webfwc.bin

4.4 Setting the Multicast Group ID

When hosts and clients are assigned the same multicast group ID number, all the clients in the group will decode the stream from the same host. You can set up to 16 groups either via the GROUP ID DIP-switches or the IP-HDMI Utility software (see Section 6.2). For example, to set the group ID to 1, you have to set DIP 1, 2 and 3 to OFF and DIP 4 to ON.

The application software group ID setup overrides the DIP-switch group ID setup.

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5 Connecting the KDS-EN2T/KDS-EN2R

You can set the **KDS-EN2T**/**KDS-EN2R** units in various configurations. For example:

- A single transmitter/receiver setup (see Section 5.1)
- A Multicasting setup (see Section 5.2)
- A video wall setup (see Section 5.3)

5.1 KDS-EN2T/KDS-EN2R Transmitter Receiver Setup

You can use the **KDS-EN2T** *HDMI to IP Transmitter* (see Section 4.1) and the **KDS-EN2R** to configure an HDMI-to-IP Transmitter and Receiver system (see Figure 4).

Always switch off the power to each device before connecting it to your **KDS-EN2T**/**KDS-EN2R**. After connecting your **KDS-EN2T**/**KDS-EN2R**, connect its power and then switch on the power to each device.

To connect the HDMI-to-IP transmitter and receiver system as shown in the example in Figure 4, do the following:

1. On the **KDS-EN2T**, connect an HDMI source (for example, the HDMI output from a media player) to the HDMI IN connector.
2. On the **KDS-EN2R**, connect the HDMI OUT connector to an HDMI acceptor (for example, a projector).
3. Connect the LAN RJ-45 connector on the **KDS-EN2T** to the LAN RJ-45 connector on the **KDS-EN2R** using an Ethernet cable.
4. On both the **KDS-EN2T** and the **KDS-EN2R**, connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 4).
5. If required, connect a PC and/or controller to the RS-232 9-pin D-sub Connector (see Section 5.4) to control the HDMI acceptor, for example.

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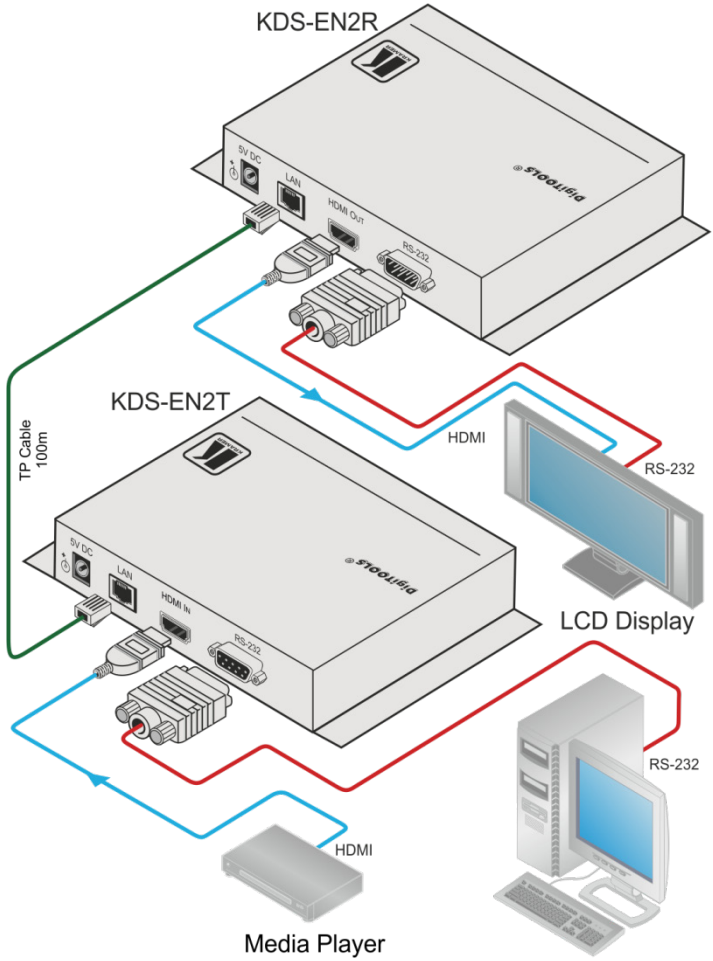

Figure 4: Connecting the HDMI to IP Transmitter and Receiver System

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5.2 Multicasting Setup

In the multicasting setup, one host (transmitter) and multiple clients (receivers) share the same group ID (see Section 4.4 and Section 6.2), so that all of the clients decode the same stream (encoded by the host), without creating additional load on the network.

The multicast addresses used range from 255.0.0.XXX to 255.0.1.XXX, where XXX stands for the group ID as set by the DIP switch (see Section 4.4).

The example illustrated in Figure 5 shows a multicast setup including one host connected to several clients sharing the same group ID. The host transmits the HDMI and RS-232 content to all the clients that share its group ID; other clients that are connected to the same Ethernet switch will not receive this content. Other hosts, with different group IDs can co-exist in the system (for example, a video wall setup, see Section 5.3).

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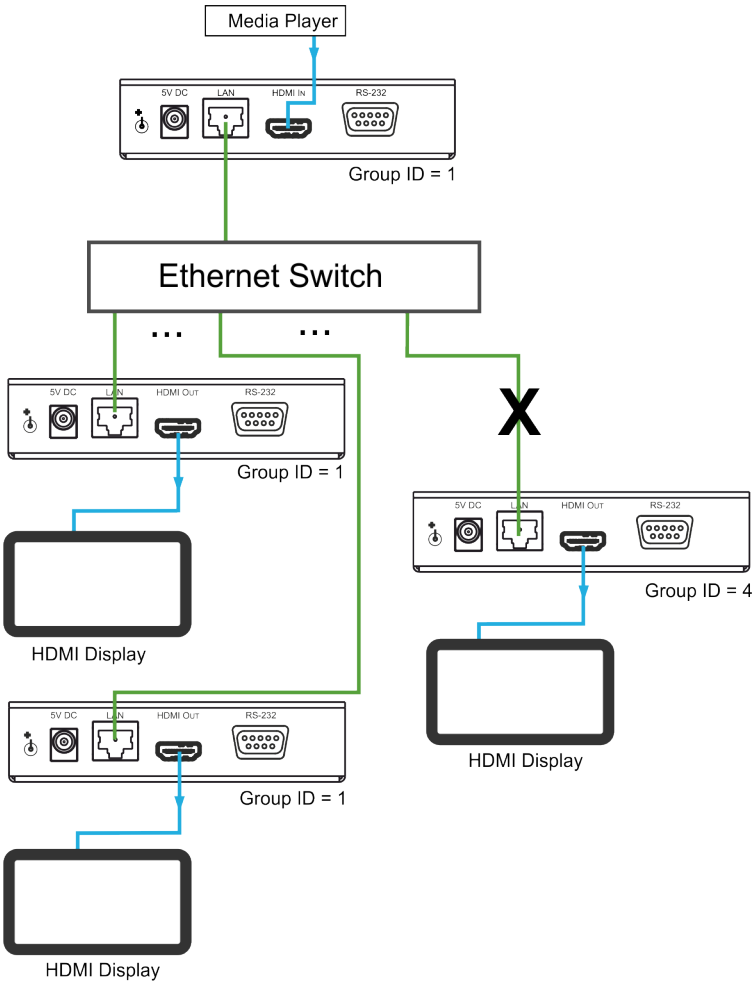

Figure 5: Multicasting Application

An additional **KDS-EN2T** host can be connected to the Ethernet switch and set to group ID 4. This host can transmit HDMI and RS-232 content to **KDS-EN2R** clients that are also set to group ID 4.

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5.3 Video Wall Setup

A video wall consists of several screens that are tiled together to form one very large display.

The video wall configuration consists of one or more transmitters that connect to a series of receivers that make up the video wall. Each display is connected to the output of one receiver. Usually a video wall setup would include several transmitters (one dedicated transmitter per row).
Using a single transmitter for a video wall will usually result in lower video quality and tearing.

The **KDS-EN2T** and **KDS-EN2R** units are each defined by their location in the video wall layout. Each **KDS-EN2T** is assigned a row number and defined by row number and position in the row. The position definition is unique and is usually defined once during the basic setup.

To simplify the video wall configuration process, the first host of the first row of the video wall is assigned to be the control portal. The control portal controls the other transmitters and receivers in the setup via the RS-232 closed loop chain (see Figure 6). The RS-232 chain lets transmitters communicate with each other even if they are not part of the same LAN.

To configure a video wall (for example, a 3x3 video wall), do the following:

1. Connect an HDMI source (for example, a media player) to the INPUT of a distribution amplifier (for example, the Kramer **VM-4HxI**, 1:4 HDMI Distribution Amplifier).
2. On the distribution amplifier, connect the outputs (for example, three outputs on the Kramer **VM-4HxI**) to the HDMI IN connectors of three **KDS-EN2T** units, respectively.
3. Connect the LAN RJ-45 connector on each **KDS-EN2T** unit to the input RJ-45 connector on an Ethernet switch.
4. Connect the output RJ-45 connectors on the Ethernet switch to nine **KDS-EN2R** units (each **KDS-EN2T** unit connected to the Ethernet Switch, distributes the signal to three **KDS-EN2R** units).

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5. Connect the 9-pin D-sub Y-cable to the three **KDS-EN2T** units, as illustrated in Figure 6.

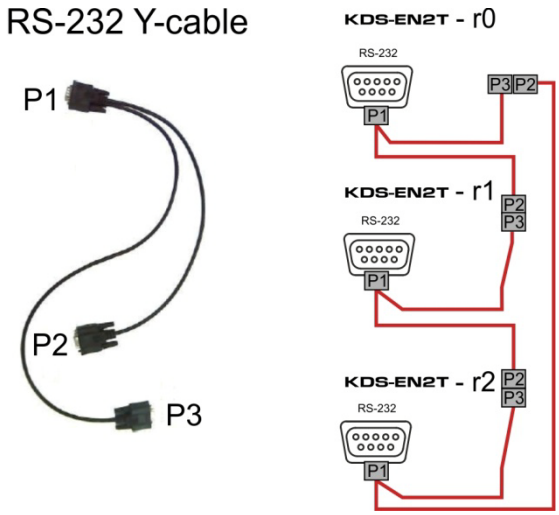

Figure 6: Connecting the RS-232 Y-cable

6. Set the group ID via the DIP-switches. For example, set the group ID of the:
   - **KDS-EN2T** transmitting to the first row and the receivers positioned in the first row to 1
   - **KDS-EN2T** transmitting to the second row and the receivers positioned in the second row to 2
   - **KDS-EN2T** transmitting to the third row and the receivers positioned in the third row to 3
7. If required, on each unit connect the 5V DC power adapter to the power socket and connect the adapter to the mains electricity (not shown in Figure 7)
8. Set the wall application for each unit via the IP HDMI Utility software and/or Web pages (see Section 6).
9. Reboot all devices. Ensure that all remote displays and all network cables are connected correctly (a video source is required at this step).

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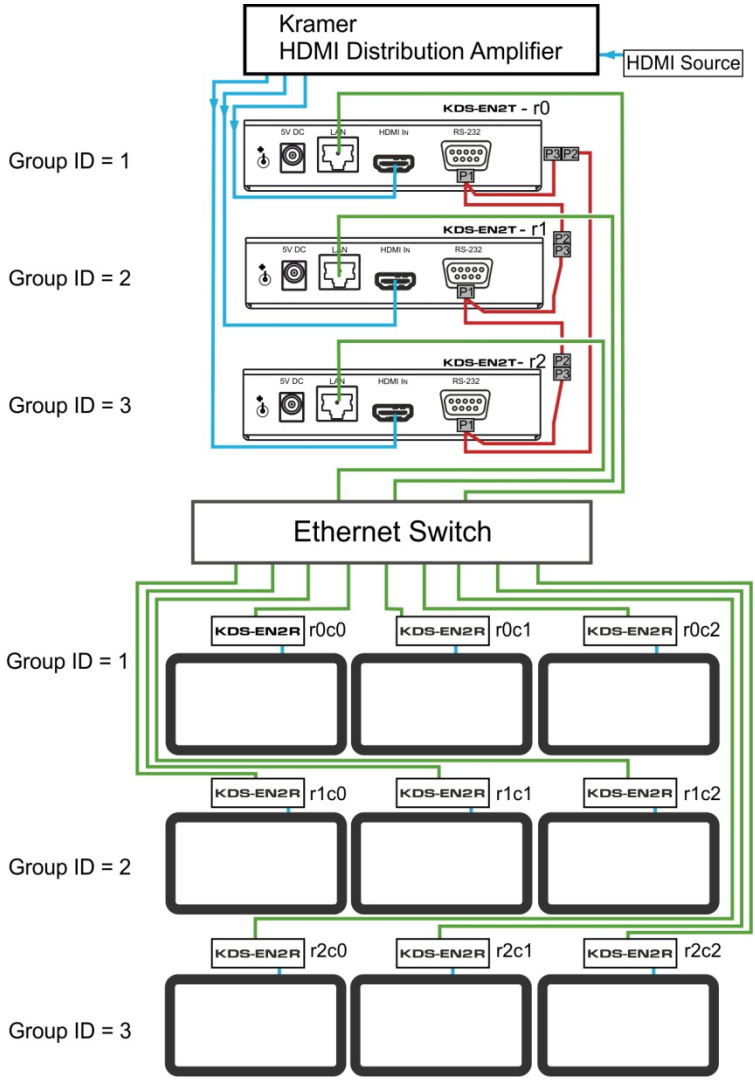

Figure 7: Video Wall Application

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5.4 Connecting to the KDS-EN2T and KDS-EN2R via RS-232

The RS-232 port can be used to:

- Control a peripheral machine in the transmitter receiver setup (when **KDS-EN2T** is connected directly to one **KDS-EN2R**), see Section 5.1 or the multicast setup, see Section 5.2
- Chain **KDS-EN2T** hosts in a video wall setup, see Section 5.3

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6 Configuring the System

To configure the system you need to:

- Download the IP HDMI utility from our Website at http://www.kramerelectronics.com
- Have the Bonjour service installed and running

To be able to access the machine, configure the control PC's network setting to use a 169.254.xxx.xxx IP domain with network mask 255.255.0.0.

6.1 Bonjour Service

The Bonjour service automatically discovers the IP numbers assigned to the hosts and clients in your system.

Bonjour service lets you discover devices connected to the network and needs to be installed on your PC before installing the IP HDMI Utility for configuring the system.
If your PC does not have "Bonjour SDK" installed, you can download it from the Apple Web site and then install it.

6.2 IP HDMI Utility

Use the IP HDMI Utility or Web page/VW to configure the connected devices in the setup. Once downloaded, follow installation instructions. After installation is complete, double click the icon on your desktop. The following window appears:

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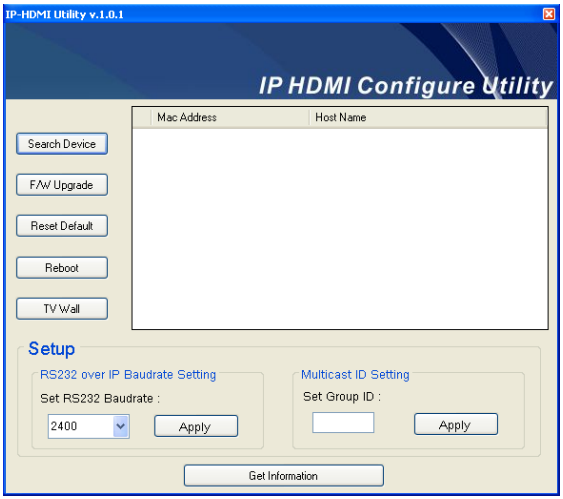

Figure 8: IP-HDMI Utility Main Window

To configure the devices:

1. Click the Search Device button.

   The software searches the network and the connected units are discovered:

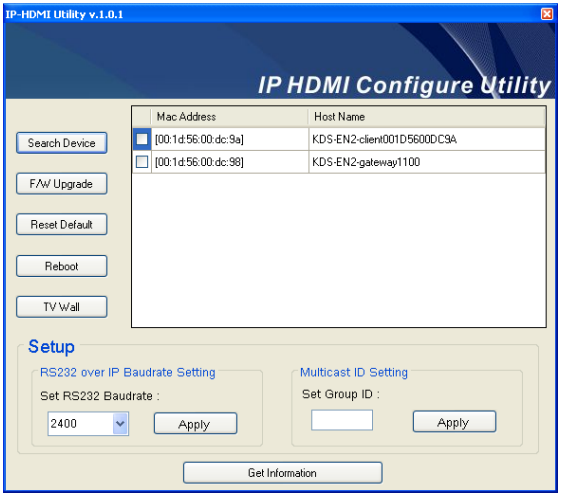

Figure 9: Devices Discovered on the Network

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Figure 9 shows two devices discovered on the network, one **KDS-EN2T** host and one **KDS-EN2R** client.

2. Check the box next to the discovered unit(s).

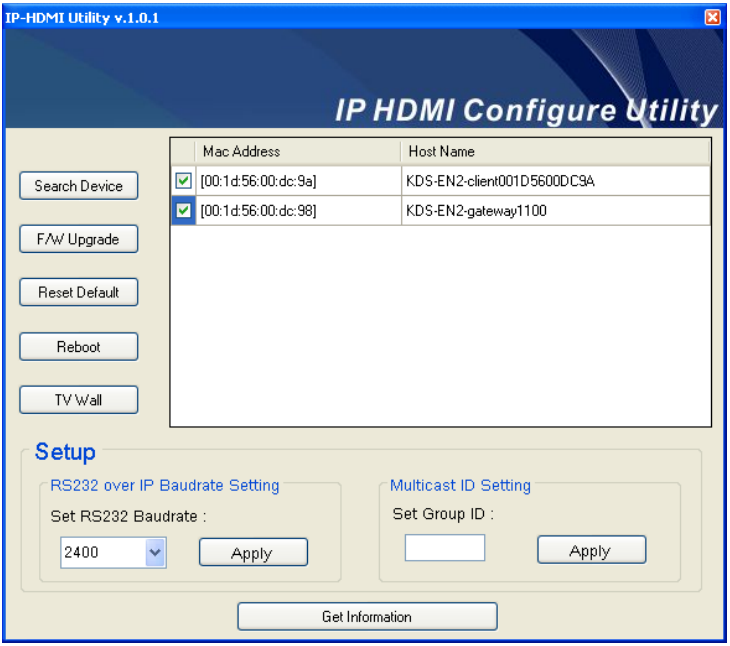

Figure 10: Check the Devices Discovered on the Network

3. Click the Get Information button.
   The following window appears:

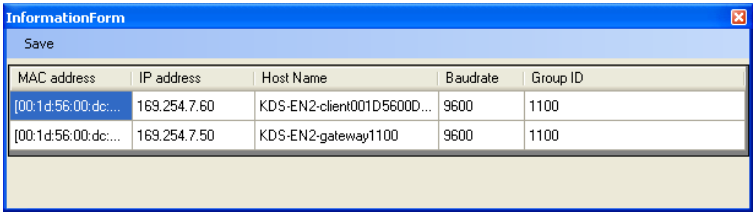

Figure 11: The Get Information Window

The Information window reveals the IP addresses of the selected devices, their baud rate and Group ID.

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In the example in Figure 11, one device is identified as the **KDS-EN2R** receiver (the client) and the other device is the host. The devices can be identified via their OSD which displays the IP number. This is very useful in a setup that includes multiple devices.

4. If required, in the main window set the RS-232 baud rate and click Apply.
   The default baud rate is set to 9600-8-N-1

5. If required (see Section 5.2), in the main window, set the group ID number and click Apply:

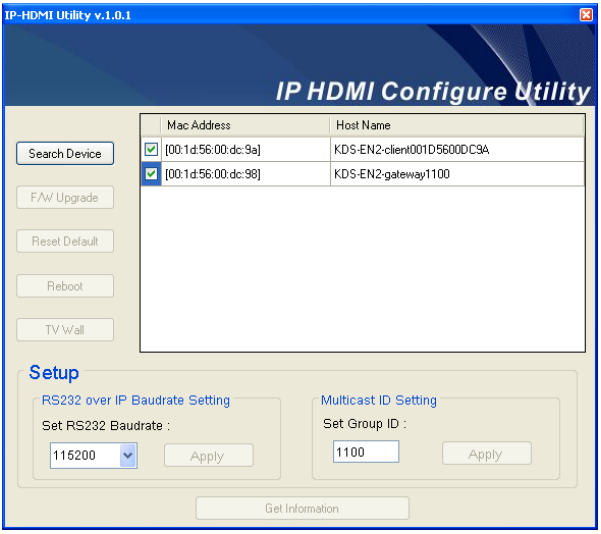

Figure 12: Apply RS-232 and Group ID settings

The following window appears:

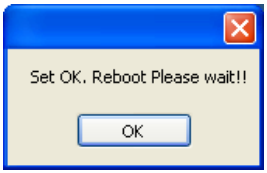

Figure 13: System Rebooting

If you are setting up a multicasting system or a single one-to-one system the configuration is complete.
To configure a TV Wall, continue to Section 6.3.

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6.3 Configuring a TV Wall Setup

To configure the TV Wall, check the transmitter device (client) for which you want to perform the setup. In the Main window click the TV Wall button to configure the TV wall. The software directs you to the device's basic setup Web page. The setup is simple and includes three basic steps (see Figure 14).

Note that at any time you can enter the Web page directly by typing the IP number or the device name in the browser address bar.

The following example shows how to configure a 3x3 TV wall:

1. Set a 3x3 TV Wall using three **KDS-EN2T** hosts and nine **KDS-EN2R** clients as illustrated in Figure 7.
2. Connect the video source and reboot the devices.
3. Configure the control PC's network setting to use 169.254.xxx.xxx IP domain with network mask 255.255.0.0.
4. Click the TV Wall button in the IP HDMI utility.
   The software enters the Web pages.
5. Click the Basic Setup tab.
   Step 1 in the basic setup appears (see Figure 14)

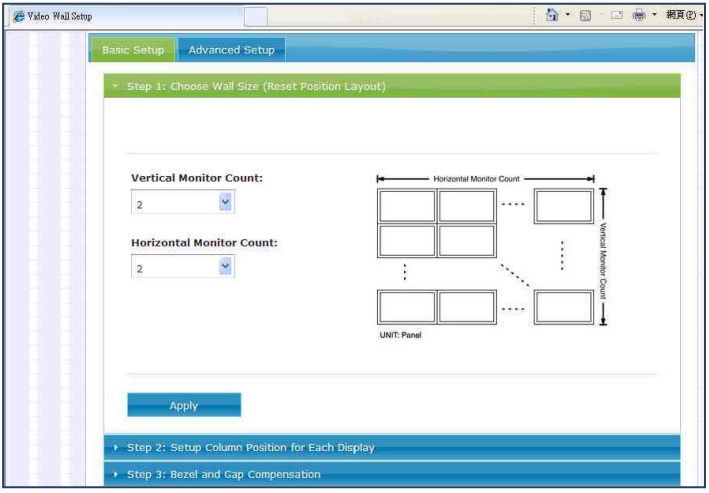

Figure 14: TV Wall Setup – Choosing Wall Size

6. Set the actual TV wall size (3x3 in this example).

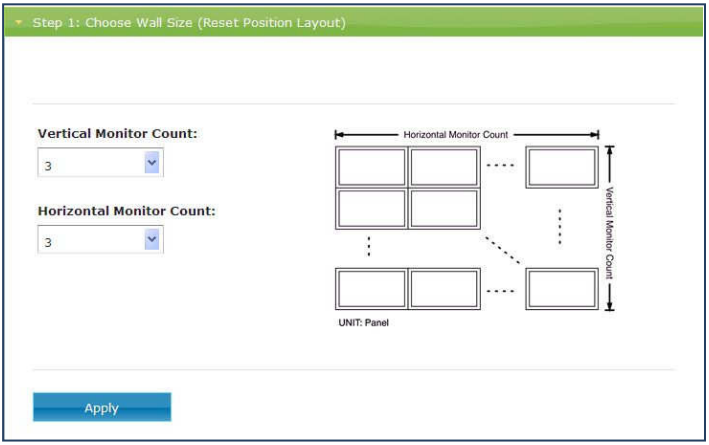

Figure 15: TV Wall Setup – Setting the Wall Size to 3x3

7. Click Apply.
   If there is no response, check cable connections.

8. In step 2 set the position of each display in the TV wall array, defining the column and row position of each display:

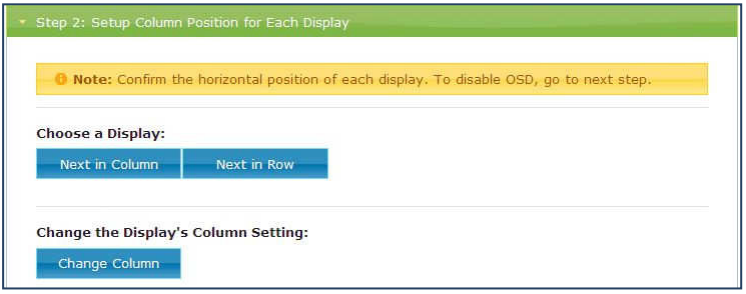
Step 2: Setup Column Position for Each Display
Note: Confirm the horizontal position of each display. To disable OSD, go to next step.
Choose a Display:
Next in Column
Next in Row
Change the Display's Column Setting:
Change Column

Figure 16: TV Wall Setup – Setting the Position of each Display

9. In step 3, set the Bezel and Gap Compensation.
   If this is not required set the values to 0.

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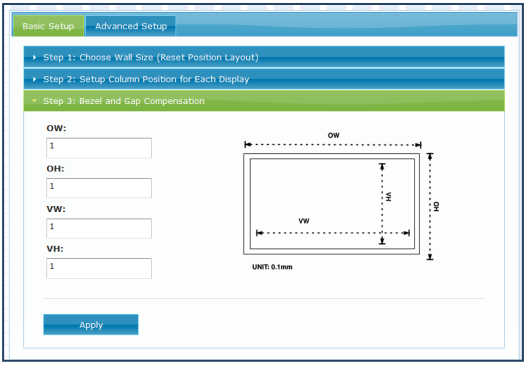

Figure 17: TV Wall Setup – Setting the Bezel and Gap Compensation

Once the 3 steps of “Basic Setup” are complete, the basic video wall configuration is ready.

6.3.1 The Advanced Setup Tab

The advanced setup tab lets you fine-tune the basic setup after it is completed and can also be accessed directly via the Web pages (see Section 6.4).

In step 1 you can select the device that you want to fine tune (see Figure 18) when in step 2.

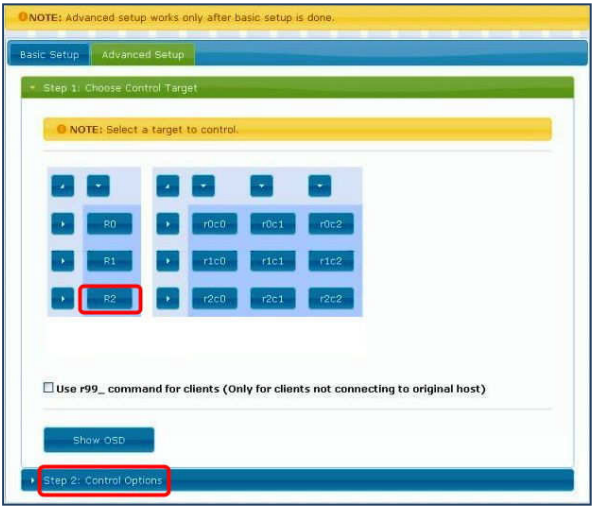

Figure 18: Advanced Setup – Selecting a device to Fine Tune

After selecting the device (in step 1), go to step 2 to set the control options for that selected device (see Figure 19 and the following table).

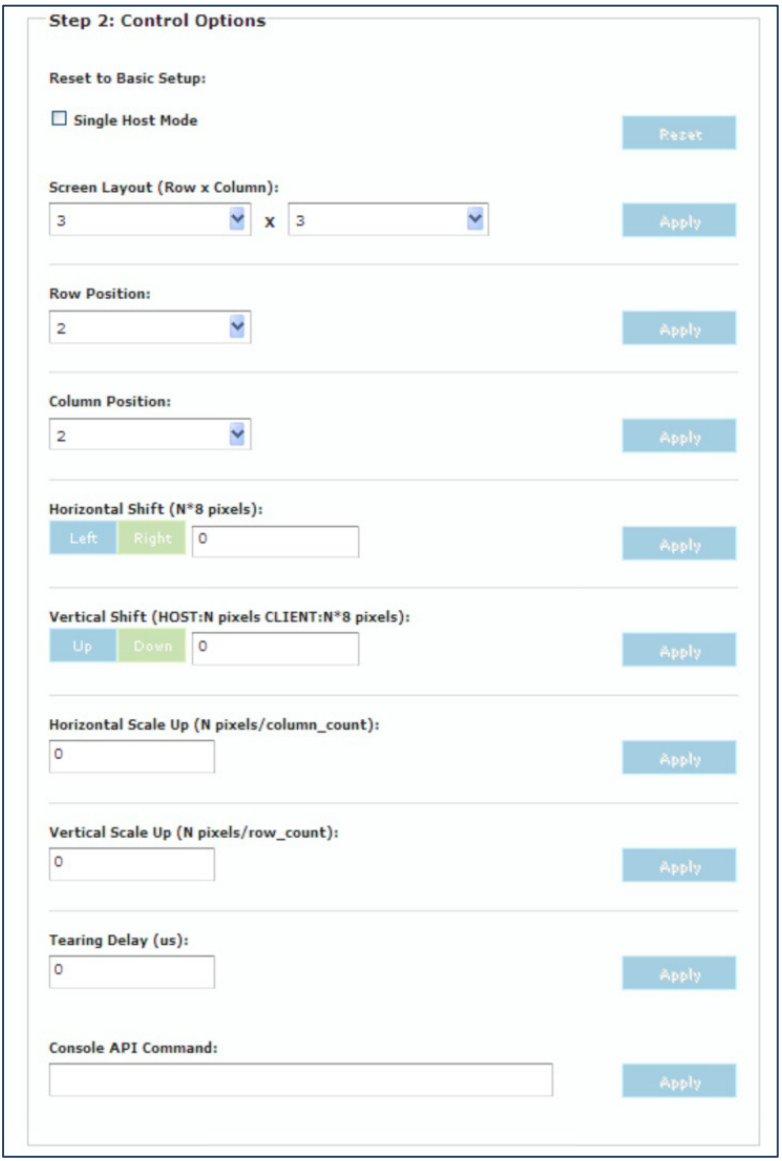

Figure 19: Advanced Setup –Fine Tune a device

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Feature	Function
Reset to Basic Setup	Reset the selected device to the basic setup parameters
Screen Layout (Row x Column)	Change the array layout
Row Position	Change the row position of the selected device
Column Position	Change the column position of the selected device
Horizontal Shift	Shift the horizontal position of the selected client device (each step moves the image by 8 pixels) Note that you cannot shift the image to the right on the displays positioned at the left edge of the video wall, thus creating a black stripe at the video wall left edge. The same applies to shifting the image at the right edge of the video wall to the left.
Vertical Shift	Shift the vertical position of the selected device (each step moves the client image by 8 pixels and the host by 1 pixel) Note that you cannot shift the image downwards on the displays positioned at the top edge of the video wall, thus creating a black stripe at the video wall top edge. The same applies to shifting the image at the lower edge of the video wall upwards.
Horizontal Scale Up	Scale up the selected client horizontally
Vertical Scale Up	Scale up the selected client vertically
Tearing Delay	Use under “single host mode” only to avoid tearing (in micro seconds) Typical value is 10,000 to 16,000
Console API Command:	Enter advanced configuration commands

6.4 The Web Pages

The Web pages can be accessed via the IP HDMI utility for configuring the basic setup and other functions or directly by entering the IP number or the device name to the browser address to fine tune the basic setup or to upgrade the firmware.

The Web pages include two tabs, the System tab (see Section 6.4.1) and the Video Wall Setup tab (see Section 6.4.2).

6.4.1 The System Tab

Includes the version information, firmware update and utilities.

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6.4.1.1 Version Information

Figure 20 shows the Version Information:

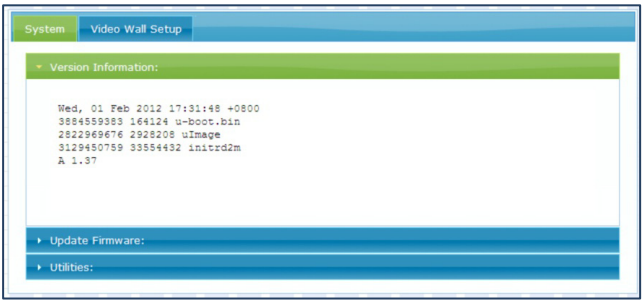

Figure 20: Web Page Version Information Window

6.4.1.2 Update Firmware

The Firmware update page (see Figure 21) lets you enter the firmware update files: webfwh.bin for the transmitter (host) and webfwc.bin for the receiver (client).

Note that you have to disconnect the unit from the system before you update the firmware.

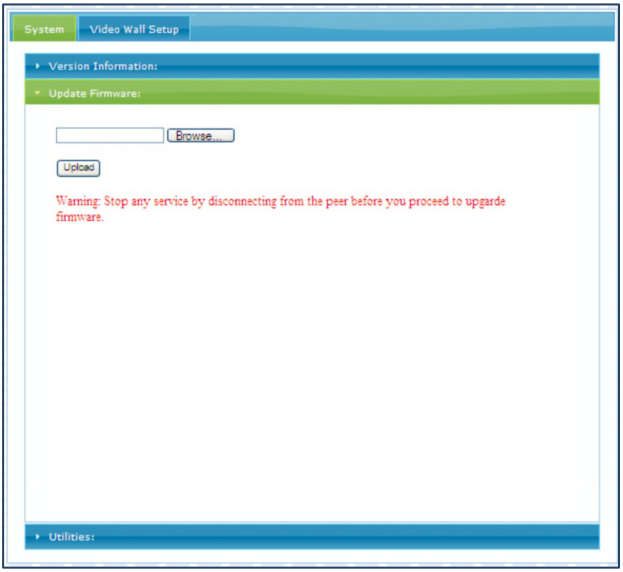

Figure 21: Web Page Firmware Update Window

After uploading the file follow the instructions on the screen.

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6.4.1.3 Utilities

Lets you enter advanced configuration commands.

6.4.2 The Video Wall Setup Tab

The Video Wall Setup lets you modify the basic configuration settings.

6.4.2.1 The Basic Setup

The basic setup lets you set the bezel and gap compensation in 0.1mm units, as well as the wall size and the position layout, see Figure 22:

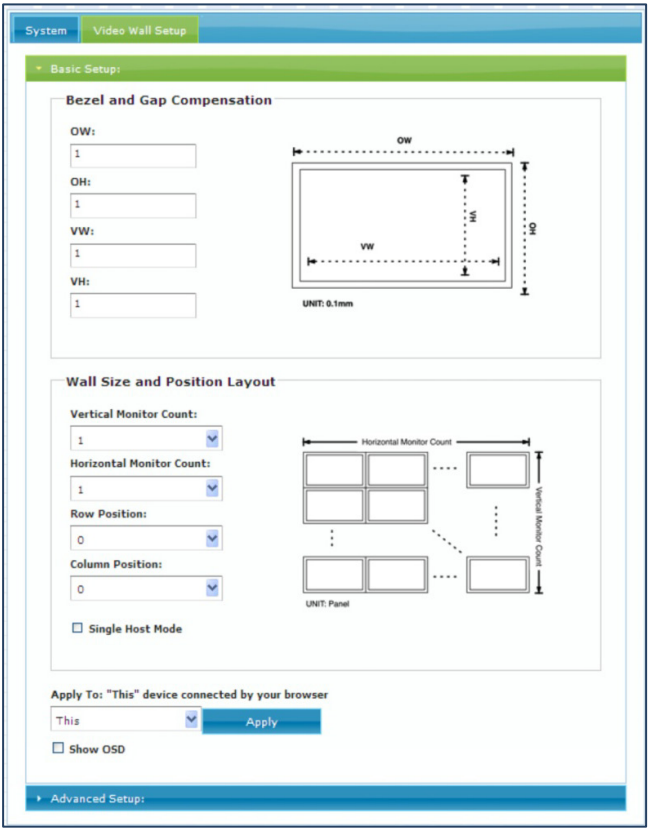

Figure 22: Web Page Basic Setup Window

6.4.3 The Advanced Setup

See Section 6.3.1.

7 Technical Specifications

	KDS-EN2T	KDS-EN2R
INPUT:	1 HDMI connector	1 LAN connector
OUTPUT:	1 LAN connector	1 HDMI connector
PORTS:	Ethernet, RS-232	
MAX. RESOLUTION:	1080p	
STANDARDS COMPLIANCE:	HDMI	
POWER SOURCE:	5V DC, 900mA	5V DC, 650mA
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)	
STORAGE TEMPERATURE:	-40° to +70°C (-40° to 158°F)	
HUMIDITY:	10% to 90%, RHL non-condensing	
DIMENSIONS:	12.1cm x 9.0cm x 2.8cm (4.7" x 3.5" x 1.1"), W, D, H	
WEIGHT:	0.8kg (1.76lbs) approx.	
ACCESSORIES:	Power supply , RS-232 cable	Power supply
Specifications are subject to change without notice at http://www.kramerelectronics.com		

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Disconnect the unit from the power supply before opening and servicing

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